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REMARKS

The Examiner will note that the dependency of claim 7 has been corrected. This should obviate the formal rejection under 35 U.S.C. 112, second paragraph.

The Examiner will also note that claim 1 has been amended to define the "previously hydrodesulfurized" feed as a separate step. Claim 12 is incorporated into claim 1. Support for this amendment is found on page 9 of the specification and in original claims 5, 6 and 14. It is urged that this amendment be entered as it will place the case in condition to be allowed or in the alternative in better form for appeal.

The claims were rejected under 35 U.S.C. 103(a) as being unpatentable over Hatanaka et al. (5,906,730) in view of Harandi (5,554,275). The Examiner set forth the following conclusions with regard to the combined teachings of the cited references.

(1) It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Hatanaka by utilizing the desulfurization process of Harandi as the second desulfurization step because separate desulfurization and stripping steps will not be required.

(2) It also would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the combined teachings of Hatanaka and Harandi by utilizing a stripping gas having the composition as in claim 4 because any concentration of hydrogen would be expected to promote the hydrodesulfurization reactions.

(3) It also would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the combined teachings of Hatanaka

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and Harandi by utilizing a concurrent system because as long as there is contact between the hydrogen, feed, and catalyst, regardless of the direction of contacting, an effective process would be expected to result.

(4) It also would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the combined teachings of Hatanaka and Harandi by utilizing feeds to the second desulfurization step having sulfur concentrations as in claims 12 and 13 because the desulfurization would be expected to be effective in reducing sulfur concentrations regardless of the initial sulfur concentration.

The primary reference to Hatanaka relates to a process for hydrodesulfurizing cat cracked gasoline while suppressing hydrogenation of olefins to minimize octane reduction. As can be seen from col. 2, lines 49-61, increasing desulfurization rates leads to more hydrogen sulfide which results in increased thiol (mercaptan) formation by reaction with olefins. The process of Hatanaka divides a single stage hydrodesulfurization into two or more stages. Each stage takes place under specific reaction conditions to control the extent of desulfurization at each step (col. 3, lines 1-35).

The secondary reference to Harandi teaches a single stage hydrodesulfurization process involving hydrogenating and stripping a volatile light hydrocarbon feed (col. 1, lines 26-31). As stated by Harandi, prior processes have required a separate selective hydrodesulfurization step to remove organo-sulfur compounds and a separate stripping tower to remove light ends (col. 1, lines 14-19).

The Examiner has not indicated what would motivate one skilled in the art to apply the teaching of Harandi to the second step of Hatanaka. In the process of Harandi,

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selective hydrodesulfurization takes place in a single reactor system (Fig. 1 and col. 3, lines 12-47). Since Harandi is a single stage hydrodesulfurization process, one would logically prick the first step of Hatanaka since one could then eliminate the expense of any subsequent hydrodesulfurization steps.

Furthermore, in applicants' two stage hydrodesulfurization process as set forth in amended claim 1, the first stage hydrodesulfurized product contains less than 30 wppm non-mercaptan sulfur. In Example 1 of Hatanaka, the product from the first step has a sulfur content of 12 wppm from thiols (mercaptans) and a total sulfur content of 63 wppm. Thus the non-thiol (non-mercaptan) content is 51 wppm. This is well above the 30 wppm upper limit set for non-mercaptan sulfur in applicants' amended claim 1. In the comparative example 1 of Hatanaka, the first stage product contained a thiol sulfur content of 7 wppm and a total sulfur content of 15 wppm leading to a non-mercaptan content of 8 wppm. Thus the results of Hatanaka would lead one skilled in the art directly away from the invention in applicants' amended claim 1.

The Examiner's conclusions set forth in (2) and (3) above relate to dependent claims and must, therefore, fall because independent claim 1 is patentable over the art as noted above.

In conclusion (4), the Examiner notes that the feeds to the second desulfurization step have sulfur concentration as in claims 12 and 13 because the desulfurization would be expected to be effective in reducing sulfur concentrations regardless of the initial sulfur concentration.

In contrast, the examples and the limited desulfurization of step 1 of the Hatanaka process teach away from the non-mercaptan sulfur amount set forth in applicants'

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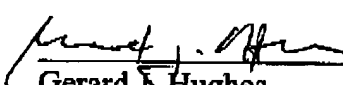
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amended claim 1. Harandi is silent as to the degree of hydrodesulfurization obtainable by his process. Thus conclusion (4) has been overcome by said amended claim 1.

For the reasons noted above, it is urged that applicants have made a patentable advance in the art. Entry of this amendment and allowance of the application are respectfully solicited.

Respectfully submitted,

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